BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

REPUBLIC OF FRANCE

NATIONAL INSTITUTE
OF INDUSTRIAL PROPERTY

PARIS

(11) Publication No.: 2 082 591
(To be used only for reproduction orders).

(21) Nat'l Registration No.: 70 10045
(To be used for payments of annuities, official copies orders and all other correspondence with I.N.P.I.)

(15)

PATENT OF INVENTION

FIRST AND UNIQUE PUBLICATION

(22) Date of Deposit ..... March 20, 1970, at 2:05 p.m.

Date of issuance decision ..... November 15, 1971.

Publication of issuance ..... B.O.P.I. - "Listes" No. 49 of 12-10-72

(51) International Classification (Int. Cl.[3]). . . . . B 29 d 5/00//A 44 b 21/00

(71) Depositor: **Company : VELCRO FRANCE, Public company, residing in France.**

(73) Owner: Same as (71)

(74) Attorney: Aymard Law Office, formerly Danzer & Aymard

(54) **Removable fastening strip and processes and machines to manufacture it.**

(72) Invention of: Patrick Billarant, Robert Goubeau and Jacques Langlois.

(33) (32) (31) Conventional priority:

This invention relates to removable fastening strips comprising a support, or foundation, gripping elements having at their free extremities, an enlarged head suitable to cooperate with gripping elements carried by another strip.

Elements with enlarged heads cooperate either with loops, fibrous or fluffy materials, materials made of screen or cellular foams, other materials, or with elements of the same type carried by another strip.

It is already known strips with gripping elements carrying enlarged head in the shape of swelling extremity obtained with partial fusion, but this process is not applicable in the case of heads having well defined geometrical shape, because the fusion causes formation of a swelling having random shape.

The object of this invention is a new type of gripping elements with enlarged head, as well as its manufacturing processes, and machines to manufacture gripping elements, particularly more usable for manufacturing gripping elements of this invention.

According to this invention, removable fastening strip carrying gripping elements is characterized by the fact that its male elements are made of stems extending approximately perpendicular to their support, or foundation, their extremity having a section similar to that of an arrow or harpoon head, the point of which is roughly aligned with the stem, and constitutes extreme part of each element.

According to an embodiment of this invention, a strip carrying only male elements cooperating with female elements deposited on an associated strip.

Process according to this invention for manufacturing removable fastening strip comprising at least male gripping elements having extreme enlarged head, particularly arrow or harpoon head shape, is characterized by the fact that it is made with extrusion through a die having a shape corresponding to the cross-section of complete strip, including its foundation and gripping elements, and extruded pieces are at least transversely

cut without cutting through the base carrying said rows of elements to obtain spaced gripping elements, parallel and being in one piece with the base forming foundation. These pieces are continuously exiting the die and parallel to the extruding direction.

Another process according to this invention for manufacturing removable fastening strip comprising at least male gripping elements having extreme enlarged head, particularly arrow or harpoon shape head, is characterized by the fact that mould cavities having male element shape are realized, then a material is injected into these cavities to make isolated male gripping elements, a layer of material is distributed over these elements in continuous extrusion to form the foundation to be attached to injected elements still remained in theirs cavities, and finally the assembly which is made of foundation and injected elements, is removed from its support.

Machine according to this invention to be used with this second process is characterized by the fact that it comprises : a conveyor, on the surface of which there are mould cavities having the shape of gripping elements; a station to make said cavities; an injecting station where said elements are made by injection; a distributing station, for example, with continuous extrusion of a material layer forming the foundation; a removing station where at least certain pieces defining said cavities are removed; and an extracting and stocking station of the strip and foundation to which injected elements are attached.

This invention will be better understood with the reading of following description, with reference to annexed drawings, relating to two preferred manufacturing processes of this invention.

In these drawings :

Fig. 1 is a partial perspective view of a removable fastening strip according to this invention;

Fig. 2 shows, in a larger scale, a gripping element of Fig. 1;

Fig. 3 shows, in perspective, an extruding die and part of the strip obtained from this die;

Fig. 4 shows the strip of Fig. 3 once cut;

Fig. 5 shows schematically a machine designed to be used with the second process of this invention;

Fig. 6 is a side view of the conveyor cylinder alone of the machine in Fig. 5;

Fig. 7 and 8 are cross-sectional views, in a larger scale, and along lines VII - VII and VIII - VIII of Fig. 6, certain pieces having been removed;

Fig. 9 is a cross-sectional view along the line IX - IX of Fig. 6; and

Fig. 10 is a partial view from the top of conveyor cylinder developed and equipped with mobile pieces.

First, with reference to Figures 1 and 2, strip 1 is shown with its support 2, or foundation, on which are attached male gripping elements 3 having enlarged head 4 and filiform stem 5 serving as liaison with foundation 2. According to this invention, head 4 is at least arranged to have the shape of an arrow or harpoon head, sharp part 6 of which made of the end of element 3. Advantageously, head 4 may have, at its junction with stem 5, recess part 7 for improving the gripping of elements 3 with corresponding elements of another strip.

Foundation 2 may be provided with any material and preferably supple. Elements 3 may also be made of any material, for example synthetic material, and are supple allowing able to be bent during separation of two strips.

Elements 3 are designed to cooperate, either with elements which are of the loop type, fluffy or fibrous materials, materials made of scree or cellular foams, or other materials, carried by the other strip, or with gripping elements identical or of the same type carried by the other strip. Tapered form of heads 4 allows elements 3 to penetrate into fibers network for better fastening the two strips. In the event that elements of both strips are of the same type, head 4 elastically penetrates between two heads 4 of the other strip, they are mutually blocked themselves by their back part.

During separation of the two strips, heads 4 and bodies 5 bend, this fact provides disengagement of the two strips.

Strip 1 may comprise, in addition to above-described male elements 3, female elements

such as loops, fibrous or fluffy materials, materials made of screen or cellular foams, designed to cooperate with male elements of the other strip, this second strip also carries female elements for cooperating with male elements of the first strip.

Strip 1 according to this invention may be manufactured according to any process, but preferably with one or the other of the processes according to this invention and described below, particularly more usable when head of male elements has a well defined geometrical shape, particularly harpoon head shape which cannot be obtained by fusion process of stem extremities.

First manufacturing process according to this invention is illustrated in Figs. 3 and 4 and uses continuous extrusion. In these figures, it is shown die 8 used for the manufacturing of strip 9 comprising foundation 10 and gripping elements 11 similar to elements 3, but naturally other head shapes are also possible.

Die 8 has an active hollow profile 12, cross-section of which corresponds to that of strip 9, with its foundation 10 and its rows of elements 11, cross-section being obtained by transversely cutting the body of elements 11. Profile 12 has rectangular part 13 as foundation and perpendicular part 14, parts 13 and 14 are attached together so that the strip can be made in one piece at the exit of die 8.

At the exit of die 8, foundation 10 is obtained with its final shape, and sections 15 which have the same cross-section as that of elements 11 to be obtained, sections 15 and foundation 10 being in one piece.

After cooling, cross cutting is made (Fig. 4) up to the level of foundation 10, such that sections 15 are cut to provide elements 11 separated from each other but still attached to the foundation. Cutting operation is done by any known means with cutting tool 16 which may be a blade driven back-and-forth with an linear movement, or a fixed axle rotating cutter comprising one or several helicoidal threads.

A variation of this process consists in making the separation of gripping elements at the

level of die 8; for this a mobile flap is provided (not shown), before or after the die, which alternately masks and unmasks opening 14 of die 8; when openings 14 is masked, extruded section has the cross-section of foundation 10 alone and, when these openings are unmasked, the section has the cross-section of strip with its elements 11.

Another variation consists in extruding sections 15 and foundation 10 separately. Preferably, separated extrusions are done at adjacent stations and the reunion of the two sections is done while these sections are still at their viscous state. This variation is particularly more usable when foundation 10 and elements 11 must be made with different materials.

In one or the other of these three aforesaid extruding processes, it is possible to make a longitudinal cutting to remove excess material and to provide male elements with their final shape.

Moreover, it is possible to model extruded elements when they are still in their viscous state to give them a particular shape which cannot be obtained with extrusion or machining, this modeling operation being operated in any desired direction.

Second manufacturing process according to this invention is illustrated in Fig. 5 to 9. With reference to Fig. 5, a conveyor is shown as cylindrical roller 17 rotating around its axis 18 and passing successively before : station 20 making mould cavities having the shape of gripping elements, extruding station 22 for the foundation, cooling station 23 for injected and extruded products, station 24 for liberating heads of gripping elements and, station 25 for extracting and stocking strips.

This process will be described below for the manufacturing of a strip, gripping elements of which has harpoon shape enlarged heads, but naturally it is possible to use any other shapes of head.

At station 20, mould cavities having the same shape as that of male gripping elements to be obtained, are provided on the periphery of cylinder 17. According to a preferred embodiment, these cavities are made with the cooperation of cylinder 17 and needles 26

(Fig. 9 and 10) which rest on cylinder and centered on it, these needles 26 being placed along the generatrices.

Cavities are defined as follows (Fig. 6 to 9) : cylinder is made of a succession of pairs of coaxial disks 28, 29 comprising, at regular angular intervals, for ones, (disks 28) radial and solid stems 30, and for others (disks 3) triangular grooves 31 having the same angular intervals, diameter of disks 29 being equal to diameter of the disk of stems 30; during mounting operation (Fig. 9) median axial planes of stems 30 and grooves 31 are aligned such to obtain mould cavities 32, fixed but separated, limited by two successive disks 28, their widths are equal to the width of disks 29 and they provide room for grooves 31; each cavity 32 is flanked, according to a generatrix, by two stems 30; volume of an element 3 (Fig. 2) is then obtained with the addition of two needles 26; each needle is inserted between two rows of stem 30 and rests laterally on them while it rests on the most radial part on cylindrical areas of disks 28, 29; each cavity 32 is then determined by two stems 30, two needles 26, two disks 28 and disk 29 and, it has the same shape as that of element 3. Recess part 7 of elements 3 is obtained by providing two grooves 33 (Fig. 7) at the base of stems 30 and two corresponding raised edges 34 on needles 26. Needles are arranged such that they barely touch upper level of stems 30.

At station 20, needles 26 are inserted between stems 30 which center [illegible], eventually with grooves 33, and rest on disks. At station 21, material is injected with force into these cavities, opened at their upper part, by injection device 35, such that these cavities are filled and that elements 3 are obtained but remained on the cylinder. At station 22, extruder 36 distributes film 37 having selected thickness and width, for connecting injected elements 3 by the extremities touching the surface of cylinder 17. Dependent on materials used for injection and extrusion, contact between elements 3 and film 37 is done when elements are

still at their plastic or solid state but, in general, elements 3 will still be at its plastic state.

Station 25 insures the cooling and solidification of film 37 and eventually elements 3. Cooling device 38 may be of any type, for example, air or water cooling device. At the exit of station 23, strip 1 is made but elements 3 are still in cylinder 17 while they are covered by foundation 2.

In the adopted embodiment, operation for removing needles 26 is done at station 24, while the strip is till on the cylinder. Heads 4 of elements are then liberated but strip 1 remains on the cylinder thanks to roller 40 of station 25,

At this station 25, strip 1 tangentially leaves the cylinder at 41 and is received on stocking reel 42. It is noted that the strip may leave the cylinder because grooves 31 on disks 29 are opened to the outside and therefore unable to retain heads 4.

With regard to means used for inserting and removing needles 26, it is possible to use several devices. For instance, it is possible, as shown in Fig. 5, to provide unitary inserting device 27 for insertion of needles on cylinder, needles being independent from each other and successively inserted, and extracting device 39. At station 20, insertion may be done either axially, or radially while the extraction may be done only axially at station 24. Needles 26 rest by gravity between stations 20 and 24.

It is also possible, as shown in Fig. 10, to make needles 26 in one piece by one of their extremities and to make them cooperate with a fixed rail 43 defining their position vis-a-vis the cylinder. For this, needles may be continuously reunited by a supple band (not shown) guided by rail 43, or discontinuously and in series, by rigid and consecutive support pieces 44 cooperating each with rail 43 via at least a roller or finger 45. Rail 43 is adjacent to cylinder 17 and at least between stations 20 and 24, passing by station 22. At the exit of station 20, the rail will have a circular section 43a, at a constant distant from the cylinder, and extending from station 20 to station 24.

On this section 43a, needles are in advanced positions to determine volumes 32. At station 20, the rail has ramp 43b, the distance of which to cylinder 17 is variable so that at the entrance of this station needles are in recess position and that they are in advanced position at the exit. In the same manner, the rail has, at station 24, opposite ramp 43c which moves needles in advanced position to their recess position for liberating heads 4. Between station 24 exit and station 20, the rail has a last circular section 43d and apart from the cylinder in order to maintain needles in recess, this section is connected to two ramps 43b and 43c. To facilitate the guiding of needles, they remains on one extremity of the cylinder in a recess position.

A first variation of the process consists in removing strip 1 from cylinder 17 without having to priorly extract needles 26. Needles which are accessible this time, remains enclosed by the strip due to heads 4 and then may be ejected either by longitudinal sliding, or in the case of independent needles, by gravity and transversely, providing, for instance, on a roller such as roller 40, a very sharp curvature to the strip, resulting in putting apart elements 3 of two successive rows and allowing corresponding needle 26 to fall between these two rows.

Another variation of the process consists in distributing strip 37 already made by extrusion, weaving or other method, and consequently a distributor should be provided at station 22. In this case, the fastening of injected elements 3 on film 37 is done either by the fact that injected elements are still at their plastic state, or by covering film 37 with adhesives.

Another variation of the process consists, in the same time with the distribution of film 37 by extruding or using other means, in distributing another film also by extruding or using other means, and this, in the event that it is desirable to provide the foundation with two layers of materials.

This invention is certainly not limited to above-described embodiments; on the contrary, it is possible to conceive various variations without exiting the scope of this invention, notably by subsequently adding other male and female elements on the strip so manufactured.

CLAIMS

1. Removable fastening strip comprising at least male gripping elements having enlarged extremity head characterized by the fact that male elements are made of stem extending roughly perpendicular to their support and extreme enlarged head having a cross-section at least similar to an arrow or harpoon head, the point of which is roughly aligned with the stem and represents extreme part of the element.

2. Fastening strip according to claim 1, characterized by the fact that at the junction between a stem and an arrow or harpoon shape head, there are two notches in the head.

3. Removable fastener comprising two strips according to any one of claims 1 and 2, characterized by the fact that male elements cooperate with materials having loops, fibrous or fluffy materials, materials made of scree or cellular foams.

4. Removable fastener comprising two strips according to any one of claims 1 and 2, characterized by the fact that male elements of one strip cooperate with male elements of the other strip.

5. Manufacturing process of a removable fastening strip comprising at least male gripping elements having enlarged head, characterized by the fact that it is provided a continuous extrusion of a section having a cross-section identical to that of a complete strip, with its foundation and its gripping elements, and this section is cutting out at least transversely and partially, continuously and parallel to the extruding direction to obtain gripping elements which are spaced, parallel and in one piece with the support forming foundation.

6. Manufacturing process according to claim 5, characterized by the fact that a longitudinal machining is performed to remove excess extruded material.

7. Manufacturing process according to any one of claims 5 and 6, characterized by the fact that a modeling is made.

8. Machine for using the process according to any one of claims 5 to 7, characterized by the fact that it comprises, on the one hand, a die having an opening, the active profile of which is identical to the cross-section of complete strip, with its foundation and its enlarged head elements.

and on the hand, cutting-out means suitable for making transversely and at least partially a notch in the extruded section to form separated gripping elements and in one piece with the foundation.

9. Manufacturing process of a removable fastening strip comprising gripping male elements having enlarged head, characterized by the fact that continuous extrusion of separated sections is performed, these sections have same cross-section as that of gripping elements; that these sections are attached to a foundation and; that they are cut-out at least transversely to obtain spaced and parallel gripping elements.

10. Manufacturing process according to claim 9, characterized by the fact that the foundation is extruded near the extruding station and that foundation and sections are made in one piece when they are still in their plastic state.

11. Machine for using the process according to any one of claims 9 and 10, characterized by the fact that it comprises a die, the opening of which has active profile identical to the cross-section of at least one gripping element and cutting means suitable to at least transversely and partially make a notch to the assembly to form separated gripping elements which are in one piece with the foundation.

12. Manufacturing process of a removable fastening strip comprising at least gripping male elements with enlarged head, characterized by the fact that a continuous extrusion is performed through a die having alternately a profile identical to that of a complete strip, and a profile identical to that of the foundation alone.

13. Machine for using the process according to claim 12, characterized by the fact that it comprises, on the one hand, a die whose active profile is identical to the cross-section of complete strip and, on the other hand, means suitable to alternately mask die opening zone corresponding to cross-section of gripping elements.

14. Machine according to claim 13, characterized by the fact that said means are made of mobile flap placed against the die.

15. Manufacturing process of a removable fastening strip comprising at least male gripping elements with enlarged head, characterized by the fact that mould cavities having the shape of

gripping elements are provided, that a material is injected into these cavities to make isolated elements, that a layer of material is provided forming foundation and suitable to be attached to isolated elements by its non-enlarged extremities and to connect them, elements still remained in their cavities, and that the assembly made of foundation and gripping elements are removed from its support.

16. Manufacturing process according to claim 15, characterized by the fact that the layer forming foundation is distributed by extrusion.

17. Machine for using the process according to any one of claims 15 and 16, characterized by the fact that it comprises : a conveyor at the surface of which cavities having the shape of gripping elements are provided; a mounting station to make said cavities; an injecting station to make these elements by injection into the cavities; a distributing station to provide a layer of material forming foundation; a removing station to remove at least certain pieces defining said cavities; and an extracting and stocking station of complete strip.

18. Machine according to claim 17, characterized by the fact that the conveyor is a rotating cylinder.

19. Machine according to any one of claims 17 and 18, characterized by the fact that means to make cavities are made of raised parts and recess parts provided at the surface of conveyor and removable pieces deposited on the conveyor.

20. Machine according to claim 19, characterized by the fact that said pieces rest between raised parts.

21. Machine according to claim 20, characterized by the fact that needles are suitable to axially slide between conveyor and the foundation for their withdrawal.

22. Machine according to claim 20, characterized by the fact that needles are suitable to fall by gravity when a sharp curvature is imposed to the strip.

23. Machine according to claim 21, characterized by the fact that needles are in one piece, at least in series, by one of their extremity which cooperate with a guide extending to a point adjacent

to conveyor, the distance of which to the guide varies to determine longitudinal position of needles vis-a-vis the conveyor.

24. Machine according to claim 23, characterized by the fact that the rail has an inserting ramp of needles at mounting station, a circular section located at a constant close distance from the conveyor going from the mounting station at least to the removing station, an opposite withdrawal ramp for removing needles, and a circular section located at a constant remote distance from the conveyor, the rail is constituting by a closed loop and the needles forming a closed circular cylindrical bundle.

25. Fastening strip according to claims 1 and 2, characterized by that fact that it is made according to the process and with the machine according to any one of claims 5 to 22.

Translated by Henry D. Mai
Member of A.T.A.
May 1991

Fig:1

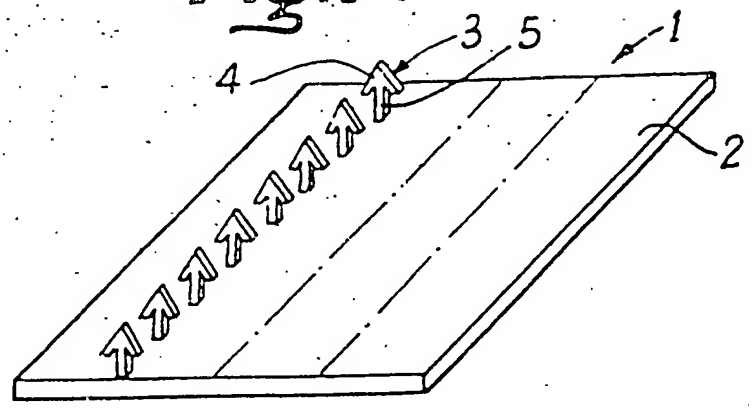

Fig:2

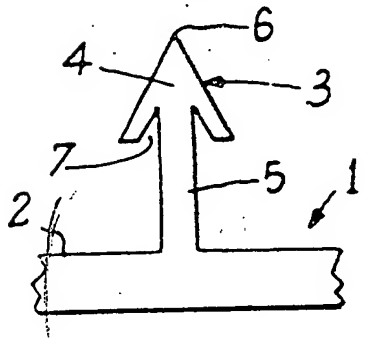

Fig:3

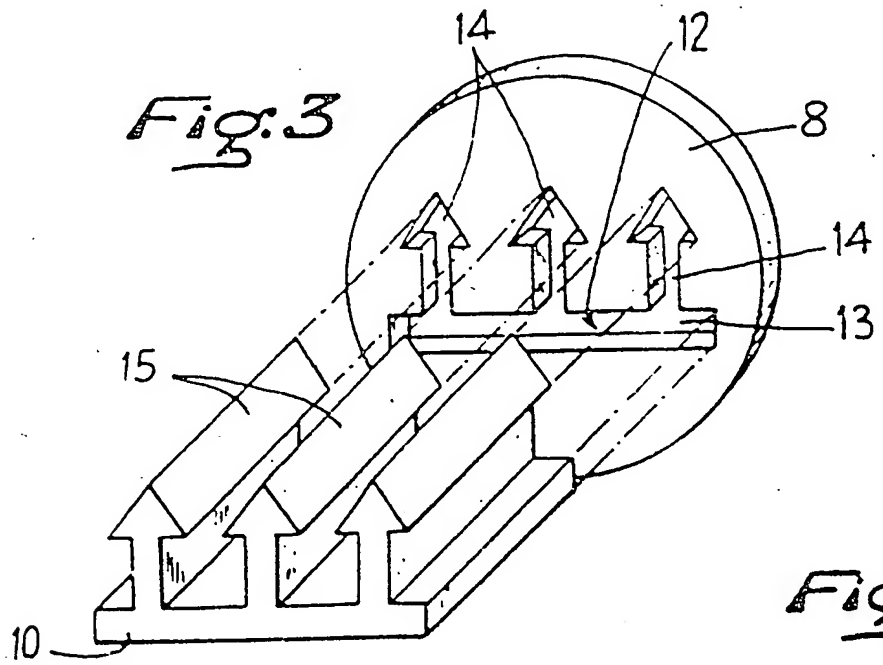

Fig:6

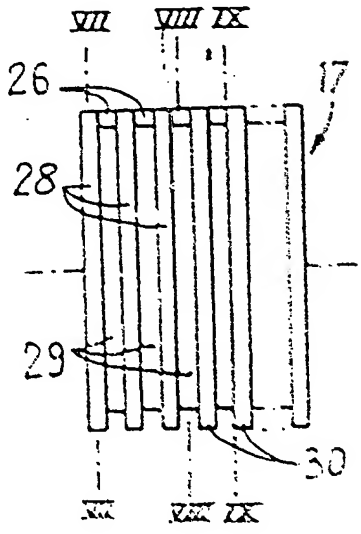

Fig:4

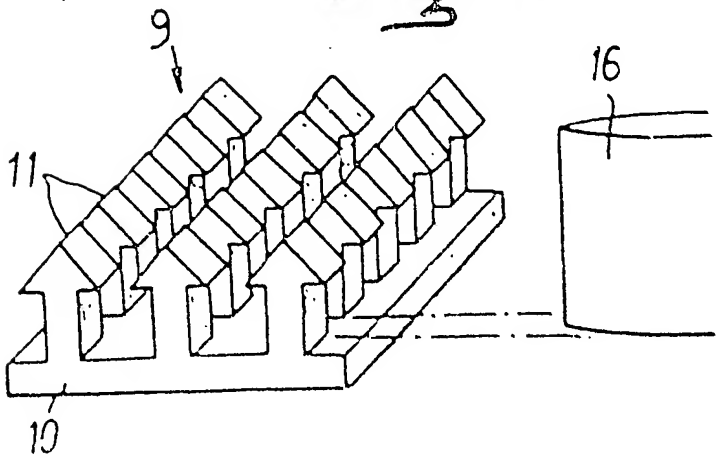

Fig: 5

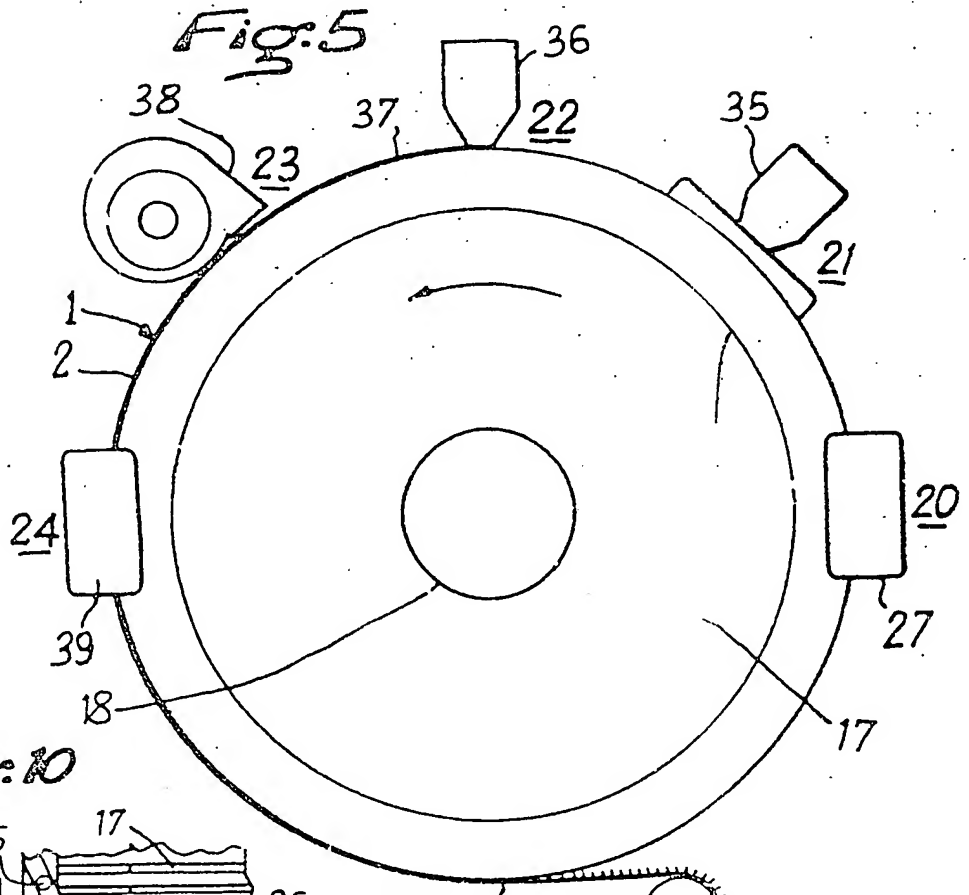

Fig: 10

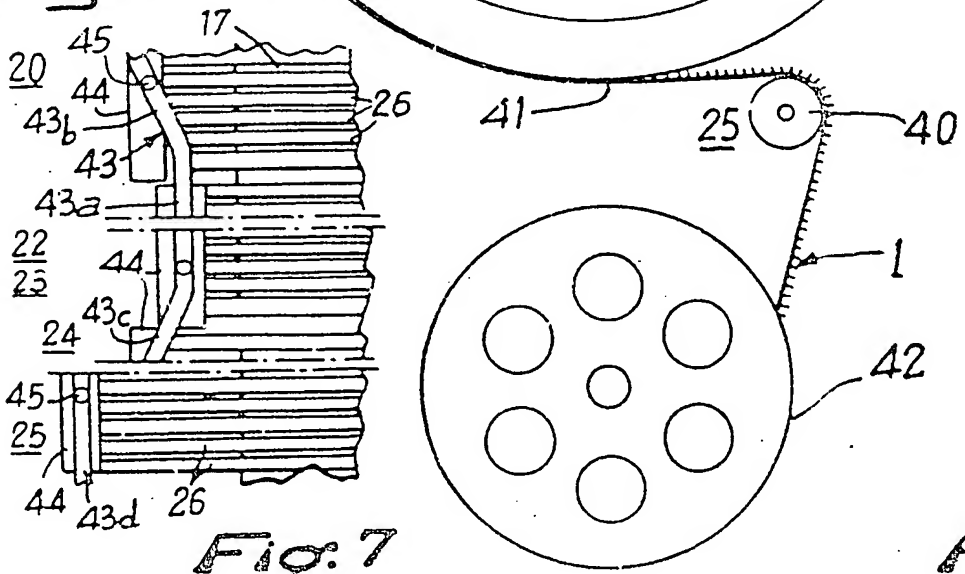

Fig: 7

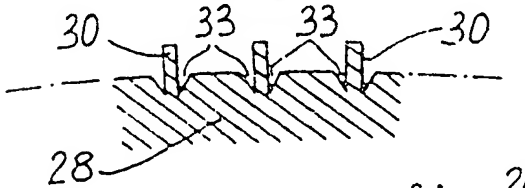

Fig: 8

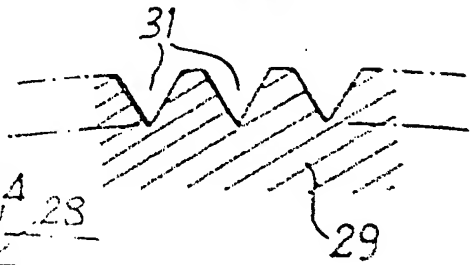

Fig: 9